

1 Attorney Docket Number 20010202.ORI

2

3 Walk Behind Floor Stripping Machine with Hydraulic Drive

4

5 Inventors: Martin L. Anderson

6

7 Background of the Invention

8

9 Field of the Invention

10

11 This invention relates to machines for stripping materials, such as adhesive  
12 bonded floor coverings from floor surfaces, and more particularly to a machine of this  
13 type incorporating an electric motor drive system for moving the machine's cutting  
14 head in an orbital pattern and a hydraulic system for driving its wheels and thereby  
15 allowing an easier to control, variable speed machine for floor stripping.

16

17 Description of the Related Art

18

19 U.S. Patent Number 4,162,809 issued July 31, 1979 for a motorized carpet and  
20 tile stripping machine that comprises a box-like housing mounted on a pair of wheels  
21 disposed near the rear of the housing and a cutting blade projecting outwardly from  
22 the front of the housing and adapted to engage the ground beneath a floor covering  
23 adhesively bonded to the floor. Supported on an upper deck of the housing is an  
24 electric motor whose output shaft is coupled to the machine's cutting head by means  
25 of an eccentric drive shaft such that the cutting head is made to move in an orbital or

1 elliptical pattern. An elongated handle is affixed to the upper deck of the housing and  
2 slopes rearward and upward terminating in handle grips. However the stripper had to  
3 be propelled by the force applied to the handles by a user. The strippers were heavy  
4 and hard to handle.

5 Self-propelled floor stripping machines such U.S. Patent Number 6,135,566  
6 issued on October 24, 2000 were introduced to provide powered drive wheels  
7 reducing the user's task to steering the floor stripper machine instead of pushing and  
8 steering. However there were several drawbacks to the self-propelled floor stripping  
9 machine. The speed of the floor stripping machine was not easily changed, a belt  
10 would have to be moved to a different diameter portion of a pulley wheel leading into  
11 a gear reduction box to change the speed and there were only 3 speeds to select from.  
12 The floor stripper would have to be shut off to switch from forward to reverse. The  
13 floor stripper did not have a neutral to disengage the drive wheels so that the machine  
14 could be easily pushed. Additionally the floor stripper did not have a safety feature to  
15 stop the machine in case it was meeting a high resistance such as from snagging or  
16 getting caught on something.

17 Further a clutch mechanism was required to operate the wheels in conjunction  
18 with the cutting head member, which would cause jerky starts. Numerous gears, belts,  
19 bearings and drive shafts were needed to provide power to the drive wheels. All these  
20 parts were difficult to assemble, and keep in repair. Further they were noisy and  
21 reduced the power actually delivered to the drive wheels making the stripper less  
22 power efficient.

23

24

Summary of the Invention

The self-propelled floor stripping machine provides a hydraulic motor for easily selecting a speed for the self-propelled floor stripping machine as well as providing for forward and reverse direction controls without having to stop the machine to change belts, drums or make other mechanical changes. The hydraulic motor provides power to the drive wheels of the floor stripper while the electric motor provides power to the continuously operating cutting head member. The electric motor also drives a hydraulic pump for operating the hydraulic motor. The hydraulic system replaces the cumbersome clutch, gears, pulleys, belts, bearings drive shafts and other mechanical drive mechanism parts of prior self-propelled floor stripping machines and improves the ease of use of the machine. The hydraulically driven self-propelled floor stripping machine can select from a continuum of forward or reverse speeds by opening or closing a valve. The self-propelled floor stripping machine can be set to neutral allowing the drive wheels to spin freely thus allowing the self-propelled floor stripping machine to be wheeled easily by the user.

The hydraulic system uses less electricity than a mechanical system which is of benefit where the capacity of electric power is limited at a site. Further the hydraulic self-propelled floor stripping machine helps conserve electrical energy and costs less to operate.

The hydraulic self-propelled floor stripping machine has a safety feature where a hydraulic valve can open for stopping the machine when it encounters a high resistance and protect parts from being overstressed.

Objects of the Invention

It is an object of the invention to provide a variable speed self-propelled floor-stripping machine with a continuum of speeds to select from.

It is an object of the invention to provide a self-propelled floor stripping machine which is easily changed from forward to reverse without shutting the machine off.

It is an object of the invention to provide self-propelled floor-stripping machine with a neutral drive wheel feature to move the machine easily without power.

It is an object of the invention to provide a safety valve in the hydraulics to prevent the machine from use of excessive force when engaging an object.

It is an object of the invention to provide a hydraulic safety valve to protect the machine from being overstressed.

It is an object of the invention to provide a machine that operates with lower electrical power consumption.

It is an object of the invention to provide a hydraulically powered floor stripping machine.

It is an object of the invention to provide a quieter floor stripping machine.

It is an object of the invention to provide a lower cost floor stripping machine.

It is an object of the invention to provide a more reliable floor stripping machine.

It is an object of the invention to provide a longer lasting floor stripping machine.

It is an object of the invention to eliminate clutches and other mechanical parts

1 in a floor stripping machine.

2 Other objects, advantages and novel features of the present invention will  
3 become apparent from the following detailed description of the invention when  
4 considered in conjunction with the accompanying drawing.

5  
6 Brief Description of the Drawings

7  
8 Fig. 1 is a perspective view of the floor stripping machine.

9 Fig. 2 is a perspective view of the drive mechanism of the floor stripper machine.

10 Fig. 3 is a schematic view of the hydraulic system in the floor stripper machine.

11  
12 Description of the Preferred Embodiments

13  
14 The self propelled floor stripping machine 10 has a main body portion 45  
15 having a cutting head member 28 in the front for removing carpeting and other objects  
16 attached to a floor or other generally flat surface. The cutting head member 28 is  
17 driven by electric motor 50 and is mechanically connected thereto by a shaft having  
18 an eccentric portion for moving the cutting head member 28 in an orbital motion. For  
19 a detailed view of such a mechanical connection see U.S. patent 6,135,566, which is  
20 hereby attached hereto and made a part hereof by reference. As best seen in Fig. 2, the  
21 drive wheels 14 are powered by a hydraulic motor 34 which turns sprocket wheel 38  
22 connected to drive chain 40 which is connected to drive shaft 16 on which wheel 14 is  
23 mounted. The hydraulic motor 34 is powered by a hydraulic connection between the  
24 hydraulic motor 34 and pump 32. Pump 32 is driven by a mechanical connection to

1 electric motor 50.

2           The hydraulic system for the self-propelled stripping machine 10 is shown in  
3 Fig. 3. It has a pump 32 connected by a hydraulic line 75 for pumping hydraulic fluid  
4 in the direction shown by arrow 80 to hydraulic valve system 36 which controls the  
5 speed of the self-propelled stripping machine by use of flow control valve 55, as well  
6 as the forward, reverse by use of solenoid valves 90. The hydraulic fluid can be  
7 controlled by valves in the hydraulic valve system 36 to flow to the hydraulic motor  
8 34 either through hydraulic line 76 or 77 so as to make the hydraulic motor 34 spin  
9 either in a clockwise or counter clockwise direction for driving the self-propelled  
10 stripping machine 10 selectively in the forward or reverse modes as desired. By use of  
11 proper valving the hydraulic fluid can flow in hydraulic lines 76 and 77 in either  
12 direction as indicted by arrows 82 and 84 as is well understood by those skilled in the  
13 art of hydraulics. The hydraulic system also has a pressure relief valve 70 for safety to  
14 protect the hydraulic system and limit the force applied by the self-propelled stripping  
15 machine 10 itself and other objects.

16           The pump 32 obtains hydraulic fluid from tank 30, which acts as the hydraulic  
17 reservoir for the system, through hydraulic line 74 with the hydraulic fluid flowing in  
18 the direction shown by arrow 86.

19           The hydraulic circuit is completed by hydraulic fluid flowing from the  
20 hydraulic valve system 36 to tank 30 with hydraulic fluid flowing in direction shown  
21 by arrow 85 in hydraulic line 73.

22           The hydraulic valve system 36 controls the flow rate and direction of the  
23 hydraulic fluid to hydraulic motor 34 for propelling the self-propelled stripping  
24 machine. The controls for the hydraulic valve system 36 are the flow control knob 55

1 on handle 25 to allow greater of lesser volumes of hydraulic fluid to flow to the  
2 hydraulic motor 34 thereby controlling the speed of the self propelled stripper  
3 machine 10. If no hydraulic fluid flows to the hydraulic motor 34 the self-propelled  
4 stripping machine 10 is stopped. As flow increases to the hydraulic motor 34 the  
5 speed of the self-propelled stripping machine 10 increases.

6 The hydraulic valve system 36 can be located in the handle 25 with hydraulic  
7 lines 73, 75, 76 and 77 leading thereto. Alternatively the hydraulic valve system 36  
8 can be on the main body 45 of the self-propelled stripping machine 10.

9 The hydraulic valve control 36 controls the direction of the flow of hydraulic  
10 fluid in the hydraulic lines to the hydraulic motor 34 for controlling the forward or  
11 reverse movement of the self-propelled stripping machine 10. Electrical switches 56  
12 and 58 activate solenoid valves (90) in the hydraulic valve controls 36 to select the  
13 direction of motion of the self-propelled stripping machine. For example switch 56 on  
14 handle bar 20 on handle 25 may be pressed for forward motion of the self-propelled  
15 stripping machine 10. Alternatively switch 58 on handle bar 22 on handle 25 may be  
16 pressed for backward motion of the self-propelled stripping machine 10.

17 The electric power for the self-propelled stripping machine 10 may be  
18 supplied through a power cord 65 and be controlled by an on-off switch 60.  
19 Optionally batteries, or some other source of electricity may also be used to provide  
20 power to the electric motor 50. Alternatively the electric motor 50 may be replaced by  
21 other types of motors using fuels or other sources of energy to power the pump 32.

22 The hydraulic lines 73, 75, 76, 77 and the hydraulic valve control 36 of the  
23 embodiment shown are in the handle 25 with the speed control valve 55 is directly  
24 connected thereto. A pressure relief valve 70 used in the hydraulic valve controls 36

Inc  
C2

1 provides a measure of safety for the self-propelled stripping machine 10 in that when  
2 pressure in the hydraulic lines builds up to high the valve 70 will relieve the pressure  
3 build up. The relief of pressure will save the self-propelled stripping machine 10 from  
4 oversteering itself and stop the machine 10 from damaging objects coming in contact  
5 with the self-propelled stripping machine 10. For example if the self-propelled  
6 stripping machine 10 were to snag on something it would stop before causing large  
7 amounts of damage.

8 The hydraulic valve control can be configured such that the hydraulic motor  
9 34 not receive fluid flow in either direction. The wheels 14 can then be moved freely  
10 when it is desired to push the self-propelled stripping machine 10 by hand. The  
11 electric motor 50 can run when the self-propelled stripping machine 10 is idle. In this  
12 mode the hydraulic fluid can circulate from the pump 32 to the tank 30 thus reducing  
13 the heat of the hydraulic fluid and the work of the electric motor 50 when the self-  
14 propelled stripping machine 10 is stopped. The electric motor 50 can then run at a  
15 lower temperature and use less electricity while the self-propelled stripping machine  
16 10 is not being propelled under its own power with the electric motor 50 on.

17 U.S. Patent 6,135,566 was incorporated by reference since many of the  
18 features of the 6,135,566 patent are the same in the hydraulic powered self-propelled  
19 stripping machine of the present application. The electric motor connection to drive  
20 the wheels of the self-propelled stripping machine in the 6,135,566 patent having  
21 mechanical connections with a clutch, gears and belts has been replaced with the  
22 hydraulic system as shown and described above.

23 Obviously, many modifications and variations of the present invention are  
24 possible in light of the above teachings. It is therefore to be understood that, within



